20

25

## What is claimed is:

1. A method for forming a semiconductor device having a bump electrode, the method comprising:

providing an aluminum contact pad on a substrate, at least a portion of the aluminum contact pad being exposed through a dielectric layer on the substrate;

forming an aluminum layer on the dielectric layer and the portion of the aluminum contact pad exposed through the dielectric layer;

forming a nickel-vanadium layer on the aluminum layer;

forming a titanium layer on the nickel-vanadium layer;

selectively forming a gold bump on the titanium layer at a location corresponding to the aluminum contact pad; and

etching the aluminum layer, the nickel-vanadium layer and the titanium layer with the gold bump as a mask.

- 2. The method as claimed in claim 1, further comprising the step of cleaning the titanium layer.
- 3. The method as claimed in claim 2, wherein the cleaning step is conducted by treating the titanium layer with a cleaning medium
- 4. The method as claimed in claim 3, wherein the cleaning medium is HCl.
- 5. A semiconductor device having a bump electrode, comprising:

a substrate having a dielectric layer formed thereon;

an aluminum contact pad on the substrate wherein at least a portion of the aluminum contact pad is exposed through the dielectric layer on the substrate;

an aluminum layer formed on the portion of the aluminum contact pad;

Thickel-vanadium layer formed on the aluminum layer;

- a ttanium layer formed on the nickel-vanadium layer; and
- a gold bump formed on the titanium layer.
- 6. The semiconductor device as claimed in claim 5, wherein the dielectric layer is a passivation layer.

Add AZ